

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1-34. (canceled).

35. (currently amended): A scrolling unit for scrolling incident unit, the scrolling unit comprising:

a rotation axis; and

at least one lens cell having an incident side and an emitting side, dividing incident light into light beams of individual lens cells, and making the rotation of the scrolling unit cause a rectilinear motion of the light beams,

wherein the at least one lens cell is formed of any of a diffractive optical element and a hologram optical element such that incident light is divided according to color.

36. (original): The scrolling unit of claim 35, wherein the rectilinear motion of the light beams is made in the direction where the light beams become closer to or farther from the rotation axis.

37. (original): The scrolling unit of claim 35, wherein the rotation of the scrolling unit causes the rectilinear motion of the light beams to be periodically repeated.

38. (previously presented): The scrolling unit of claim 35, wherein the lens cells are spirally arranged.

39. (original): The scrolling unit of claim 38, wherein the scrolling unit has a shape of a disk.

40. (previously presented): The scrolling unit of claim 38, wherein the lens cells are cylindrical lenses.

41. (currently amended): A scrolling unit having at least one lens cell and scrolling incident light in such a way that, from the viewpoint of light incident upon the at least one lens cell, the rotation of the at least one lens cell is converted into a rectilinear motion of a lens array, wherein the at least one lens cell is formed of any of a diffractive optical element and a hologram optical element such that incident light is divided according to color.

42. (original): The scrolling unit of claim 41, wherein the lens cells are spirally arranged.

43. (original): The scrolling unit of claim 42, wherein the lens cells are cylindrical lenses.

44. (previously presented): The scrolling unit of claim 41, wherein the scrolling unit has a shape of a disk.

45. (canceled).

46. (currently amended): The scrolling unit of claim 41, wherein the lens cells are arranged so that, when a normal line is drawn to the lens cells, the interval between adjacent lens cells is uniform, and the normal vectors of adjacent lens cells are the same.

47. (currently amended): A scrolling unit having at least one lens cell and scrolling incident light in such a way that, from the viewpoint of light incident upon the at least one lens cell, the rotation of the at least one lens cell is converted into a rectilinear motion of a lens array, wherein the lens cells are arranged so that, when a normal line is drawn to the lens cells, the interval between adjacent lens cells is uniform, and the normal vectors of adjacent lens cells are the same.

~~The scrolling unit of claim 46,~~ wherein a spiral track (Q_{kx}, Q_{ky}) of each of the ~~the~~ lens cells satisfies the following Equation:

$$Q_{kx} = Q_{1,x} \cos(k-1) \theta_2 - Q_{1,y} \sin(k-1) \theta_2$$

$$Q_{ky} = Q_{1,y} \sin(k-1) \theta_2 - Q_{1,x} \cos(k-1) \theta_2$$

wherein $Q_{1,x}$ and $Q_{1,y}$ denote the x and y coordinates of a first cylinder lens cell, respectively, k denotes a natural number, and θ_2 denotes a rotation angle between adjacent curves.

48. (currently amended): A scrolling unit having at least one lens cell and scrolling incident light in such a way that, from the viewpoint of light incident upon the at least one lens cell, the rotation of the at least one lens cell is converted into a rectilinear motion of a lens array.

~~The scrolling unit of claim 41, wherein the cross-section of the scrolling unit is an array of arcs having the same radius.~~

49. (original): The scrolling unit of claim 48, wherein each of the lens cells is formed of any of a binary lens, a continuous relief lens, a multi-step lens, a multi-order refractive lens, a thin hologram lens, and a volume hologram lens.

50-55. (canceled).

56. (currently amended): A projection system comprising:

a light source;

an optical splitter for splitting light emitted from the light source according to wavelength;

at least one scrolling unit having at least one lens cell and scrolling incident light in such a way that it appears to light transmitted by the lens cell that the rotation of the lens cell is converted into a rectilinear motion of a lens array,

wherein the at least one lens cell is formed of any of a diffractive optical element and a hologram optical element; and

a light valve on which the light emitted from the light source is separated into color beams by the optical splitter and the scrolling unit and on which the color beams are focused, the

light valve processing incident light according to an input image signal in order to form a color image.

57. (original): The projection system of claim 56, wherein the lens cells are spirally arranged.

58. (original): The projection system of claim 57, wherein the lens cells are cylindrical lenses.

59. (previously presented): The projection system of claim 56, wherein the scrolling unit has a shape of a disk.

60. (currently amended): A projection system comprising:
a light source;
an optical splitter for splitting light emitted from the light source according to wavelength;
at least one scrolling unit having at least one lens cell and scrolling incident light in such a way that it appears to light transmitted by the lens cell that the rotation of the lens cell is converted into a rectilinear motion of a lens array; and
a light valve on which the light emitted from the light source is separated into color beams by the optical splitter and the scrolling unit and on which the color beams are focused, the light valve processing incident light according to an input image signal in order to form a color image.
~~The projection system of claim 56, wherein at least one fly eye lens array is installed on a light path between the scrolling unit and the light valve.~~

61. (original): The projection system of claim 60, wherein a relay lens for focusing the light transmitted by the at least one fly eye lens array on the light valve is included.

62. (previously presented): The projection system of claim 56, wherein the optical splitter includes first through third dichroic filters adjacently disposed at different angles to selectively transmit or reflect the incident light according to wavelength, and the scrolling unit is installed behind the optical splitter.

63. (previously presented): The projection system of claim 56, wherein the optical splitter includes first through third dichroic filters disposed in parallel to selectively transmit or reflect the incident light according to wavelength, and the scrolling unit is installed before the optical splitter.

64. (original): The projection system of claim 63, further comprising a prism before the optical splitter.

65. (currently amended): A projection system comprising:
a light source;
an optical splitter for splitting light emitted from the light source according to
wavelength;
at least one scrolling unit having at least one lens cell and scrolling incident light in such
a way that it appears to light transmitted by the lens cell that the rotation of the lens cell is
converted into a rectilinear motion of a lens array; and
a light valve on which the light emitted from the light source is separated into color
beams by the optical splitter and the scrolling unit and on which the color beams are focused, the
light valve processing incident light according to an input image signal in order to form a color
image.

~~The projection system of claim 56,~~ wherein a first cylinder lens is installed before the at least one scrolling unit, and a second cylinder lens paired with the first cylinder lens is installed behind the scrolling unit, in order to control the width of an incident beam.

66. (original): The projection system of claim 61, wherein a first cylinder lens is installed before the at least one scrolling unit, and a second cylinder lens paired with the first cylinder lens is installed behind the scrolling unit, in order to control the width of an incident beam.

67. (canceled).

68. (currently amended): A projection system comprising:

a light source;

an optical splitter for splitting light emitted from the light source according to wavelength;

at least one scrolling unit having at least one lens cell and scrolling incident light in such a way that it appears to light transmitted by the lens cell that the rotation of the lens cell is converted into a rectilinear motion of a lens array; and

a light valve on which the light emitted from the light source is separated into color beams by the optical splitter and the scrolling unit and on which the color beams are focused, the light valve processing incident light according to an input image signal in order to form a color image.

~~The projection system of claim 56,~~ wherein the lens cells are arranged so that, when a normal line is drawn to the lens cells, the interval between adjacent lens cells is uniform, and the normal vectors of adjacent lens cells are the same.

69. (original): The projection system of claim 68, wherein a spiral track (Q_{kx}, Q_{ky}) of the lens cell satisfies the following Equation:

$$Q_{kx} = Q_{1,x} \cos(k-1) \theta_2 - Q_{1,y} \sin(k-1) \theta_2$$

$$Q_{ky} = Q_{1,y} \sin(k-1) \theta_2 - Q_{1,x} \cos(k-1) \theta_2$$

wherein $Q_{1,x}$ and $Q_{1,y}$ denote the x and y coordinates of the first cylinder lens cell, respectively, k denotes a natural number, and θ_2 denotes a rotation angle between adjacent curves.

70. (currently amended): A projection system comprising:

a light source;

an optical splitter for splitting light emitted from the light source according to wavelength;

at least one scrolling unit having at least one lens cell and scrolling incident light in such a way that it appears to light transmitted by the lens cell that the rotation of the lens cell is converted into a rectilinear motion of a lens array; and

a light valve on which the light emitted from the light source is separated into color beams by the optical splitter and the scrolling unit and on which the color beams are focused, the light valve processing incident light according to an input image signal in order to form a color image.

~~The projection system of claim 56, wherein the cross-section of the scrolling unit is an array of arcs having the same radius.~~

71. (currently amended): A projection system comprising:

a light source;

an optical splitter for splitting light emitted from the light source according to wavelength;

at least one scrolling unit having at least one lens cell and scrolling incident light in such a way that it appears to light transmitted by the lens cell that the rotation of the lens cell is converted into a rectilinear motion of a lens array,

wherein the at least one lens cell is formed of any of a diffractive optical element and a hologram optical element; and

a light valve on which the light emitted from the light source is separated into color beams by the optical splitter and the scrolling unit and on which the color beams are focused, the light valve processing incident light according to an input image signal in order to form a color image.

~~The projection system of claim 67, wherein the lens cell is formed of any of a binary lens, a continuous relief lens, a multi-step lens, a multi-order refractive lens, a thin hologram lens, and a volume hologram lens.~~

72. (previously presented): The projection system of claim 56, wherein the number of lens cells on the at least one scrolling unit is determined so that the scrolling unit can operate in synchronization with the operating frequency of the light valve.

73. (currently amended): The projection system of claim 56, wherein the rotation frequency of the scrolling unit is controlled so as to be synchronized with the operating frequency of the light valve.

74. (withdrawn): A projection system comprising:

a light source;

at least one scrolling unit having at least one cell and manufactured of any of a diffractive optical element and a hologram optical element so that light emitted from the light source is separated according to wavelength and incident light is scrolled by converting the rotation of the cell into the rectilinear motion of a cell array; and

a light valve on which the light emitted from the light source is separated into color beams by the optical splitter and the scrolling unit and on which the color beams are focused, the light valve processing incident light according to an input image signal to form a color image.

75. (withdrawn): The projection system of claim 74, wherein the lens cells are spirally arranged.

76. (withdrawn): The projection system of claim 75, wherein the rectilinear motion of the cell array is made in the direction where the cell array becomes closer to or farther from the rotation axis.

77. (withdrawn): The projection system of claim 74, wherein the scrolling unit has a shape of a disk.

78. (withdrawn): The projection system of claim 74, wherein at least one fly eye lens array is installed on a light path between the scrolling unit and the light valve.

79. (withdrawn): The projection system of claim 78, wherein a relay lens for focusing the light transmitted by the at least one fly eye lens array on the light valve is included.

80. (withdrawn): The projection system of claim 74, wherein a first cylinder lens is installed before the scrolling unit, and a second cylinder lens paired with the first cylinder lens is installed behind the scrolling unit, in order to control the width of an incident beam.

81. (withdrawn): The projection system of claim 78, wherein a first cylinder lens is installed before the scrolling unit, and a second cylinder lens paired with the first cylinder lens is installed behind the scrolling unit, in order to control the width of an incident beam.

82-110. (canceled).